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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

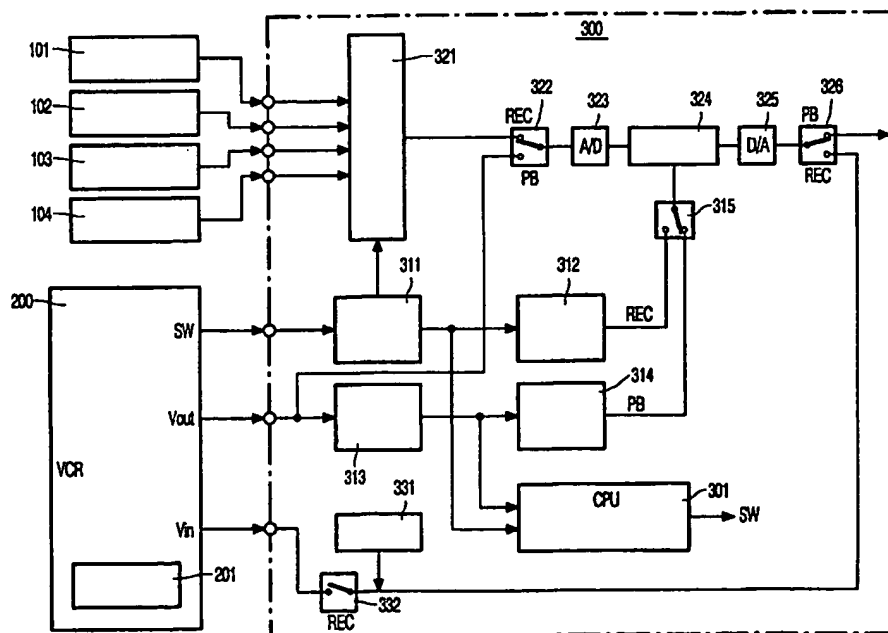
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<b>(21) International Application Number:</b> PCT/IB99/00211 <b>(22) International Filing Date:</b> 8 February 1999 (08.02.99)  <b>(30) Priority Data:</b> 10/90592                      20 March 1998 (20.03.98)                      JP  <b>(71) Applicant:</b> KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).  <b>(71) Applicant (for SE only):</b> PHILIPS AB [SE/SE]; Kottbygatan 7, Kista, S-164 85 Stockholm (SE).  <b>(72) Inventors:</b> YOSHIDA, Kozo; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). INABA, Kozo; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). KUNO, Naoki; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).  <b>(74) Agent:</b> STEENBEEK, Leonardus J.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).		<b>(81) Designated States:</b> CN, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the</i> <i>claims and to be republished in the event of the receipt of</i> <i>amendments.</i>

(54) Title: FRAME CONVERTING DEVICE

## (57) Abstract

A frame converting device wherein the frame converting device is used as incorporated with a VCR device for recording and reproduction, the operation mode can be automatically switched interlocked with the recording operation or the reproduction operation of the VCR device is realized. A frame converting device comprises two operation modes, one mode being a recording mode for producing a record signal recorded in a record medium of a recording/reproduction device based on a plurality of frame signals being multiplexed and an identification signal for identifying the frame signal, and the other mode being a reproduction mode for extracting the individual

frame signal and the individual identification signal based on the record signal read from the record medium of the recording/reproduction device. The frame converting device is provided with a mode setting unit (301, 311-315) which monitors the operation mode of the recording/reproduction device and sets the operation mode of the frame converting device to the recording mode or the reproduction mode based on the monitored result. An identification signal generating unit (301, 332, 331) generates the identification signal when the mode setting unit (301, 311-315) performs the setting of the recording mode and stops the generation of the identification signal when the mode setting unit (301, 311-315) performs the setting of the reproduction mode.



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Frame converting device.

The present invention relates to a frame converting device having a function to continuously output a plurality of image signals in a synchronized state while switching the image signals from a plurality of asynchronous inputs, and a function to extract a desired one of the continuous image signals from such plural inputs and output the extracted signal, and  
5 particularly, to improvement of operability of the device when connected to an external VCR device.

A frame converting device called an image switcher which switches image signals from a plurality of cameras and the like and outputs the signals as one image signal is  
10 known.

Generally as shown in Fig. 2, a conventional frame converting device 30 of this type is connected to a plurality of cameras 11 to 14, a time-lapse VCR device (hereinafter simply referred to as a VCR device) 20 with recording/reproduction function, which outputs a camera switch signal SW, and a monitor CRT device 40 for display. Note that an operation  
15 unit 21 constitutes input means for recording/reproduction/stop operation of the VCR device 20, and an operation unit 31 constitutes input means for recording/reproduction operation of the frame converting device 30 in correspondence with the VCR device 20.

In such a system, in recording, any one of image signals from the cameras 11 to 14 is selected in accordance with the camera switch signal SW from the VCR device 20, and  
20 outputted in a synchronized state to a video input terminal Vin of the VCR device 20. Then, recording is performed at the VCR device 20.

Further, in such system, in reproduction, an image signal from the VCR device 20 is outputted to the monitor CRT device 40.

Then, in such recording and reproduction, recording or reproduction operation  
25 at the operation unit 21 and that at the operation unit 31 must be synchronized.

In the above system, a desired operation cannot be ensured so long as the operation at the operation unit 21 and that at the operation unit 31 are not the same. If there is

a mis-operation at any one of these units, recording or reproduction cannot be normally performed.

Further, if the VCR device 20 and the frame converting device 30 are positioned away from each other, a time lag occurs between the operations at these devices.

5 During the time lag, the operations cannot be normally performed. Accordingly, even though recording has been seemingly performed by the VCR device 20, recording may not be actually performed for some period, or even though reproduction has been seemingly performed on the VCR device 20 side, a video image may not be actually displayed on the monitor CRT device 40 for some period. As a result, the VCR device 20 and the frame converting device 30 must  
10 be arranged close to each other, which greatly limits the setting place.

Note that it may be arranged such that any of these devices operates interlocked with the other device. In this case, devices for exclusive purposes must be combined. Thus, versatility of the device is inconveniently lost.

The present invention has been made to solve the above-described problems. It  
15 is an object of the invention to realize a frame converting device, interlocked with recording or reproduction operation of a recording/reproduction VCR device when used in combination with the VCR device, capable of automatically switching its operation mode.

Accordingly, the present invention provides a frame converting device as  
20 defined by claim 1. Advantageous embodiments are defined by the dependent claims.

In the frame converting device, the mode setting means monitor the operation mode of the recording/reproduction device, and set the operation mode of the frame converting device to the recording mode or the reproduction mode based on the monitored  
25 result, and the identification signal generation means generate the identification signals or stop generation of the identification signals in accordance with the operation mode. Thus, a frame converting device, interlocked with recording or reproduction operation of a recording/reproduction device, capable of automatically switching the operation mode can be realized. In this case, as the operation mode of the recording/reproduction device is monitored  
30 and the switching is interlocked with the operation mode, the versatility of the combined recording/reproduction device is not lost.

In the frame converting device of claim 2, the mode setting means monitor the camera switching signal from the recording/reproduction device, and set the operation mode of the frame converting device to the recording mode or the reproduction mode based on the

monitored result. In this case, if the camera switching signal has been detected, the mode setting means switch the operation mode to the recording mode, while if the camera switching signal has not been detected, the mode setting means switch the operation mode to the reproduction mode. In this manner, a frame converting device, interlocked with recording or reproduction operation of a recording/reproduction device, capable of automatically switching its operation mode can be realized. In this case, as the camera switching signal from the recording/reproduction device is monitored and the switching is interlocked with the camera switching signal, the versatility of the combined recording/reproduction device is not lost.

10 In the frame converting device of claim 3, the mode setting means monitor the identification signal included in the image signal from the recording/reproduction device, and set the operation mode of the frame converting device to the recording mode or the reproduction mode based on the monitored result. In this case, if the identification signal has been detected, the mode setting means switch the operation mode to the reproduction mode, while if the identification signal has not been detected, the mode setting means switch the operation mode to the recording mode. In this manner, a frame converting device, interlocked with recording or reproduction operation of a recording/reproduction device, capable of automatically switching its operation mode can be realized. In this case, as the identification signal included in the image signal from the recording/reproduction device is monitored and the switching is interlocked with the identification signal, the versatility of the combined recording/reproduction device is not lost.

20 In the frame converting device of claim 4, the mode setting means monitor the camera switching signal from the recording/reproduction device, and set the operation mode of the frame converting device to the recording mode or the reproduction mode based on the monitored result. In this case, if the camera switching signal has been detected, the mode setting means switch the operation mode to the recording mode, while if the camera switching signal has not been detected, the mode setting means switch the operation mode to the reproduction mode. Further, the mode setting means monitor the identification signal included in the image signal from the recording/reproduction device, and set the operation mode of the frame converting device to the recording mode or the reproduction mode based on the monitored result. In this case, if the identification signal has been detected, the mode setting means switch the operation mode to the reproduction mode, while if the identification signal has not been detected, the mode setting means switch the operation mode to the recording mode.

In this manner, a frame converting device, interlocked with recording or reproduction operation of a recording/reproduction device, capable of automatically switching its operation mode can be realized. In this case, as the camera switching signal from the recording/reproduction device and the identification signal included in the image signal from the recording/reproduction device are monitored and the switching is interlocked with these signals, the versatility of the combined recording/reproduction device is not lost.

In the drawings:

Fig. 1 is a block diagram of a frame converting device of an embodiment according to the invention; and

Fig. 2 is a block diagram of a conventional frame converting device.

Next, an embodiment of the present invention will be described with reference to attached drawings.

Fig. 1 is a block diagram showing the construction of a frame converting device according to the embodiment of the present invention, with a plurality of cameras and a VCR device.

In Fig. 1, image signals from four cameras 101 to 104 in an asynchronous state are inputted into a frame converting device 300. Further, an image output (Vout) and an image input (Vin) of a time-lapse VCR device (hereinafter referred to as a VCR device) 200, and a camera switch signal SW are connected to the frame converting device 300. Note that an operation unit 201 is operation means for selecting recording (REC), reproduction (PB=Play Back), stop (STOP) and the like. Note that the cameras 101 to 104 and the VCR device 200 are devices generally used in this type of system.

Further, the frame converting device 300 is constructed as follows. CPU 301 controls respective elements of the frame converting device. The CPU 301 operates in accordance with a predetermined processing program. A camera switch signal detector 311 detects the camera switch signal SW from the VCR device 200. An REC controller 312 generates a REC control signal for control in a recording mode in accordance with the result of camera switch signal detection. An ID detector 313 detects an identification signal (signal for indicating a camera from which an image signal comes) included in the image signal from the VCR device 200. A PB controller 314 generates a PB control signal for control in a reproduction mode in accordance with the result of identification-signal detection. A switch 315 is switched in accordance with an instruction from the CPU 301, for transmitting the REC control signal or the PB control signal to a memory to be described later. Note that the CPU 301 and the camera switch signal detector 311 to switch 315 construct mode setting means.

A camera switching unit 321 switches four inputs of image signals from the cameras 101 to 104 in accordance with the camera switch signal SW. A switch 322 switches the image signal switched by the camera switching unit or the image signal from the VCR device 200, in accordance with an instruction from the CPU 301. An A/D converter 323  
5 converts the image signal passed through the switch 322 into a digital image signal. A frame memory 324 (hereinafter simply referred to a memory) is capable of outputting an asynchronous image signal in a synchronized state. A D/A converter 325 D/A converts the digital image signal read from the frame memory 324 into an analog image signal. A switch 326 outputs the D/A converted image signal to an external monitor or the VCR device 200, in  
10 accordance with an instruction from the CPU 301. Note that the camera switching unit 321 to switch 326 construct frame converting means.

An ID inserting unit 331 supplies an identification signal (ID\_1 to ID\_4 respectively corresponding to the four cameras in this embodiment) to identify from which camera an image signal comes to a non-image area (vertical retrace period or the like) of the  
15 image signal, in accordance with an instruction from the CPU 301. A switch 332 supplies the image signal with the identification signal to the VCR device 200 in accordance with an instruction from the CPU 301. Note that the CPU 301, the switch 332 and the ID inserting unit 331 construct identification signal generation means.

Note that this example uses four cameras, however, the number of cameras is  
20 not limited to four. Further, although an operation unit for switching recording and reproduction of the frame converting device 300 is not shown, such operation unit may be provided.

Hereinbelow, the operation of the frame converting device of the present embodiment will be described.

25 First, an operator turns the power of the VCR device 200 on by using the operation unit 201. Then, the operator performs REC (recording), STOP (stop) or PLAY (reproduction) from the operation unit 201. At this time, a CPU (not shown) in the VCR device 200 monitors the state of the operation unit 201, and detects whether or not the above-described operation is performed by key scan of a predetermined period or the like. If the REC  
30 operation has been made, the camera switch signal SW for switching the plurality of cameras is generated, and outputted to the frame converting device 300. Further, if the STOP operation has been made, the current state is maintained. Further, if the PLAY operation has been made, reproduction of a recording medium (video tape) contained in the VCR device 200 is



performed. Note that when the power is turned off, it is arranged such that the process advances to determination whether or not the camera switch signal SW exists.

The operation and processing procedure of the VCR device 200 side are as described above. Hereinbelow, the frame converting device 300 side automatically switches  
5 the operation mode in accordance with the operation mode of the VCR device 200.

First, the camera switch-signal detector 311 monitors the camera switch signal SW, and transmits the result of detection to the CPU 301. As the VCR device 200 operates in the REC mode if the camera switch signal SW exists, the switch 332 for image signal output is turned on. Then it is judged that the VCR device 200 is in the REC mode, an identification  
10 signal is supplied from the ID inserting unit 331 to the frame-converted image signal. Then, the respective switch 315, the switch 321 and the switch 326 are switched to the REC side, so as to operate the frame converting device in the REC mode. Thus, the frame converting device 300 supplies the image signal from the camera in a synchronized state to the VCR device 200.

Further, the camera switch signal detector 311 monitors the camera switch  
15 signal SW, and if the camera switch signal SW does not exist, the switch 332 for image signal output is set to off.

Then, the result of identification-signal detection by the ID detector 313 is referred to. If the identification signal has not been detected, it is judged that the VCR device 200 is in the STOP mode or the power is turned off. Note that in this case, the respective  
20 switch 315, the switch 321 and the switch 326 are switched to the REC side, so as to operate the frame converting device in the REC mode.

Then, if the identification signal has been detected, it is determined that the VCR device 200 is in the PB mode. The respective switch 315, the switch 321 and the switch 326 are turned to the PB side, so as to operate the frame converting device in the PB mode.  
25 Thus, the frame converting device 300 supplies the image signal reproduced from the VCR device 200 to the external monitor CRT device.

As described above, the frame converting device, interlocked with REC or PLAY operation of the VCR device 200, capable of automatically switching the operation mode can be realized by monitoring the camera switching signal from the VCR device 200  
30 and the identification signal included in the image signal, and setting the operation mode of the frame converting device to the REC mode or the PB mode in accordance with the monitored result. In this case, as the camera switching signal from the VCR device 200 and the identification included in the image signal are monitored and the switching is interlocked

with these signals, any special signal is not necessary, and the versatility of the combined VCR device is not lost.

Further, there is no limitation on the setting place of the VCR device 200 and the frame converting device 300, distance between the VCR device 200 and the frame  
5 converting device 300 and the like. Further, as the operation mode of the frame converting device 300 is automatically switched in accordance with the VCR device 200, problems of time lag, malfunction, operation failure and the like do not occur.

Note that in the above-described embodiment, although the operation mode of the frame converting device 300 is determined by referring to both of the camera switch signal  
10 SW and the identification signal, the operation mode may be determined by referring to any one of these signals.

Further, in the above-described embodiment, although the frame converting device 300 is not provided with an operation unit, such operation unit may be provided. That is, it may be arranged such that the operation mode is set from the operation unit provided at  
15 the frame converting device 300.

Further, when the CPU 301 realizes the operation of the ID inserting unit 331, i.e., transmission control of the identification signal, the switch 332 may be omitted.

As described above in detail, according to the invention of the frame converting  
20 device in the present specification, the mode setting means monitors the camera switching signal from the recording/reproduction device, and sets the operation mode of the frame converting device to the recording mode or the reproduction mode based on the monitored result. In this case, if the camera switching signal has been detected, the mode setting means switches the operation mode to the recording mode, while if the camera switching signal has  
25 not been detected, the mode setting means switches the operation mode to the reproduction mode. Further, the mode setting means monitors the identification signal included in the image signal from the recording/reproduction device, and sets the operation mode of the frame converting device to the recording mode or the reproduction mode based on the monitored result. In this case, if the identification signal has been detected, the mode setting means  
30 switches the operation mode to the reproduction mode, while if the identification signal has not been detected, the mode setting means switches the operation mode to the recording mode. In this manner, a frame converting device, interlocked with recording or reproduction operation of a recording/reproduction device, capable of automatically switching its operation mode can be realized. In this case, as the camera switching signal from the

recording/reproduction device and the identification signal included in the image signal from the recording/reproduction device are monitored and the switching is interlocked with these signals, the versatility of the combined recording/reproduction device is not lost.

5 Summary of reference symbols:

- 11, 12, 13, 14: camera
- 20: VCR device
- 21: operating part
- 30: frame conversion device
- 10 31: operating part
- 40: CRT
- 101, 102, 103, 104: camera
- 200: VCR device
- 201: operating part
- 15 300: frame conversion device
- 301: CPU
- 311: camera switch signal detecting part
- 312: REC controlling part
- 313: ID detecting part
- 20 314: PB controlling part
- 315: switch
- 321: camera switching part
- 322: switch
- 323: A/D converter
- 25 324: frame memory
- 325: D/A converter
- 326: switch
- 331: ID inserting part
- 332: switch

## CLAIMS:

1. A frame converting device having two operation modes, one mode being a recording mode for producing a record signal recorded in a record medium of a recording/reproduction device based on a plurality of frame signals being multiplexed and an identification signal for identifying the frame signal, and the other mode being a reproduction mode for extracting the individual frame signal and the individual identification signal based on the record signal read from the record medium of the recording/reproduction device, the frame converting device comprising:  
mode setting means for monitoring the operation mode of the recording/reproduction device and for setting the operation mode of the frame converting device to the recording mode or the reproduction mode based on the monitored result; and  
identification signal generating means for generating the identification signal when the mode setting means perform the setting of the recording mode and for stopping of a generation of the identification signal when the mode setting means perform the setting of the reproduction mode.
2. A frame converting device as claimed in claim 1, wherein the mode setting means set the operation mode to the recording mode in case of receiving a camera switching signal from the recording/reproduction device.
3. A frame conversion device as claimed in claim 1, wherein the mode setting means set the operation mode to the reproduction mode in case of detecting the identification signal included in an image signal from the recording/reproduction device.
4. A frame conversion device as claimed in claim 1, wherein the mode setting means set the operation mode to the recording mode in case of receiving the camera switching signal from the recording/reproduction device, and wherein the mode setting means set the operation mode to the reproduction mode in case of detecting the identification signal included in the image signal from the recording/reproduction device.

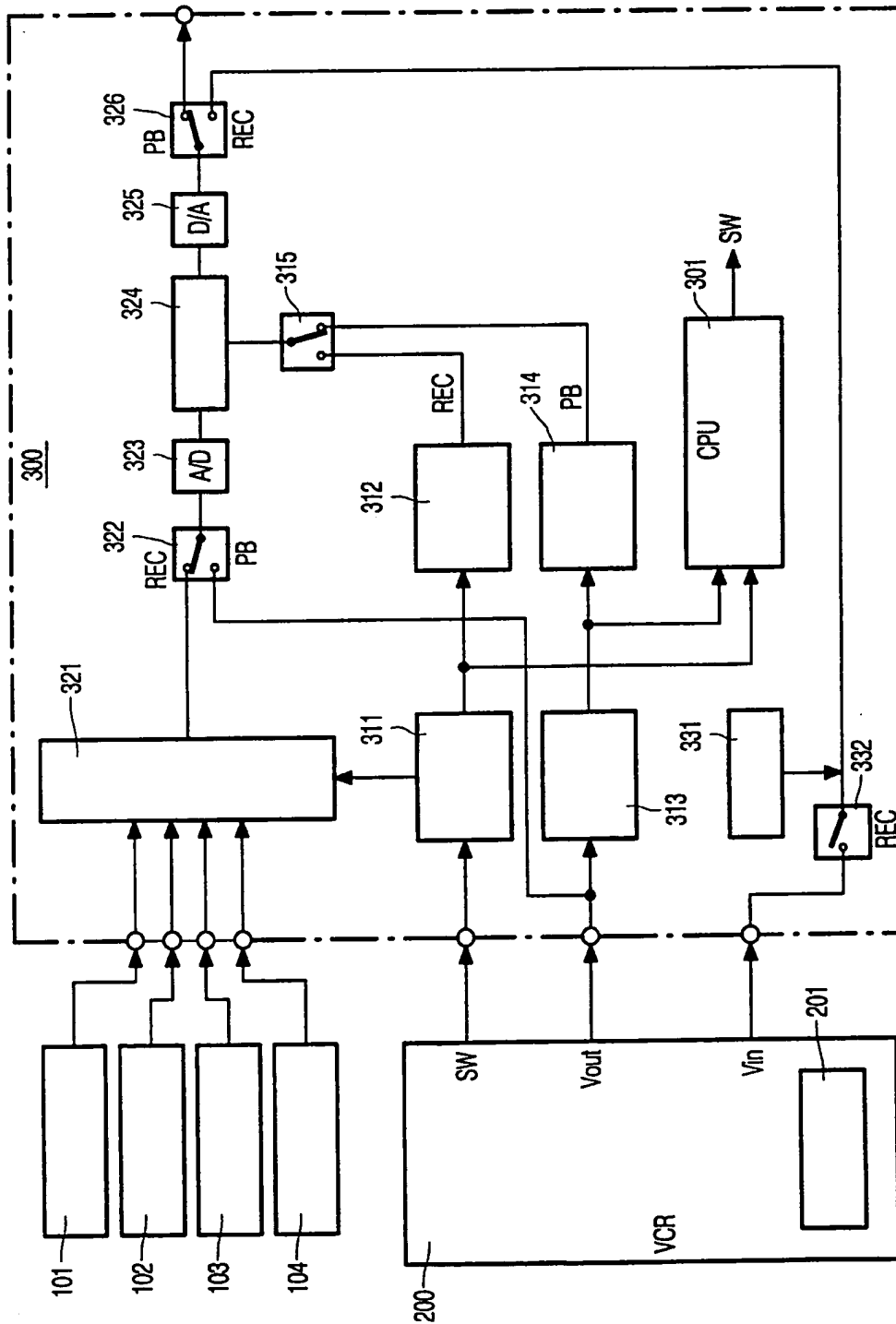


FIG. 1

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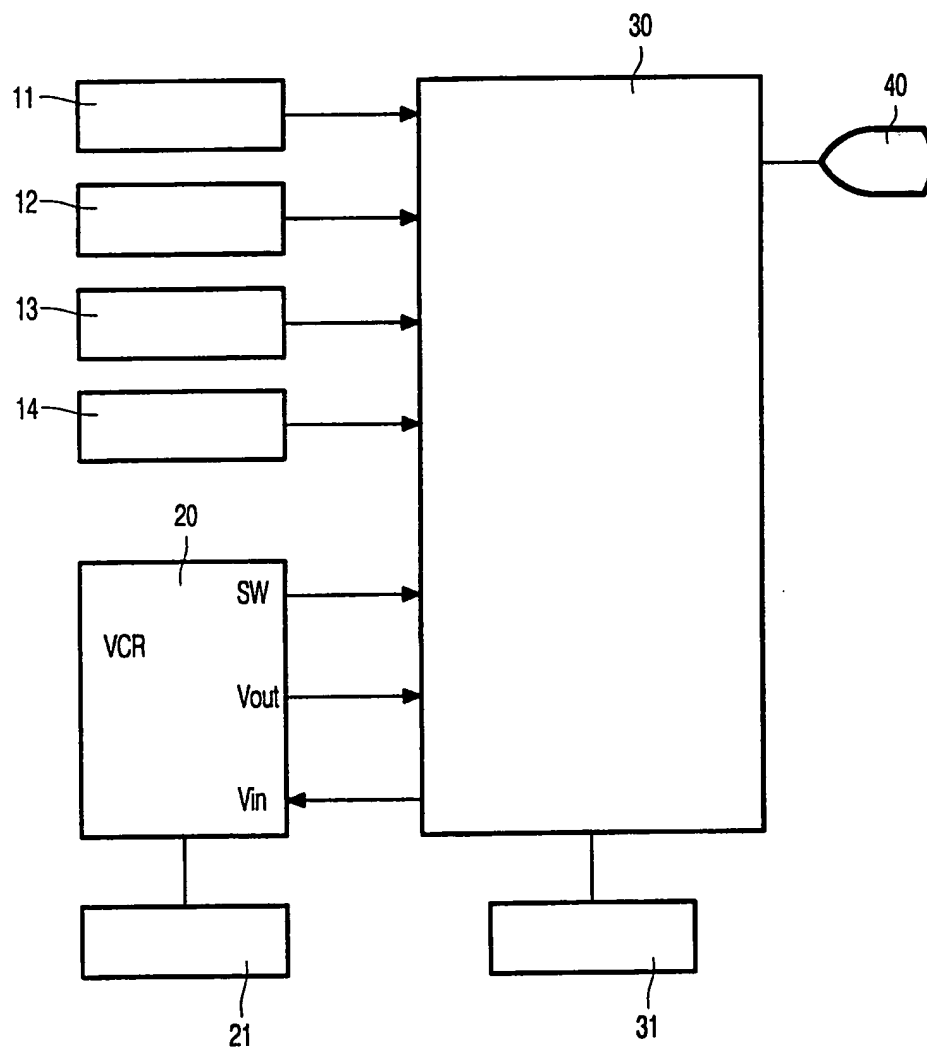


FIG. 2

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 99/00211

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04N 5/76, H04N 5/92, H04N 9/80  
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## B. FIELDS SEARCHED

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5150212 A (HYEONG-DEOK HAN), 22 Sept 1992 (22.09.92), column 2, line 29 - line 47; column 4, line 45 - line 57 --	1
A	US 5194999 A (KATSUMI NAKAJIMA ET AL), 16 March 1993 (16.03.93), column 5, line 63 - column 6, line 19, abstract --	1-4
A	US 5473481 A (BYOUNG K. MIN), 5 December 1995 (05.12.95), column 2, line 50 - column 3, line 15 -- -----	1-4

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02/08/99

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Patent document cited in search report			Publication date	Patent family member(s)		Publication date
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